



FD Assembly

Mechanical Systems

WBS 2.9.1

Victor Guarino – ANL

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FNAL Director's Review



FD Mechanical Systems

- Equipment needed to construct the FD.
 - 2.9.1.1 Vacuum Lifting Fixture to move modules.
 - 2.9.1.2 Adhesive Dispenser for apply structural adhesive on the surface of modules.
 - MMA ventilation system
 - 2.9.1.3 Block Safety Restraint Beam for restraining the top of blocks during assembly which increases the SF in buckling.
 - 2.9.1.4 Block Pivoter and Pallet
 - 2.9.1.5 Survey Equipment to survey and align the blocks during construction.



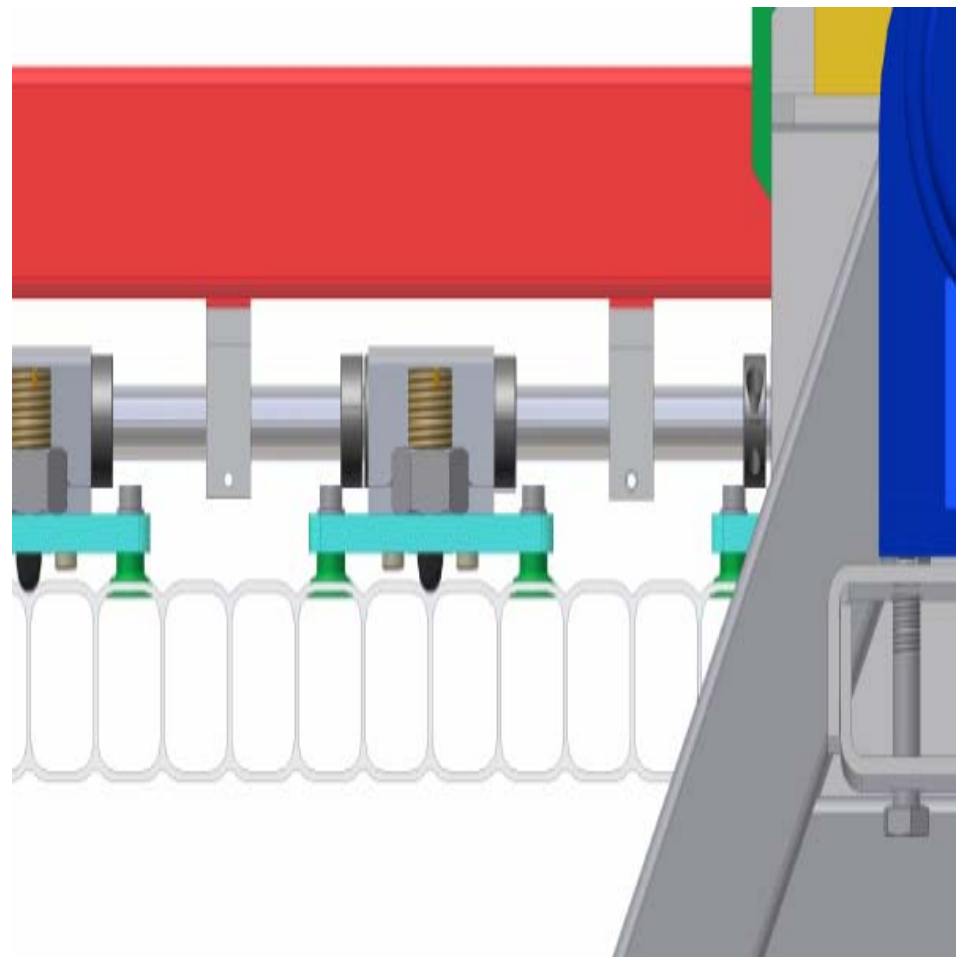
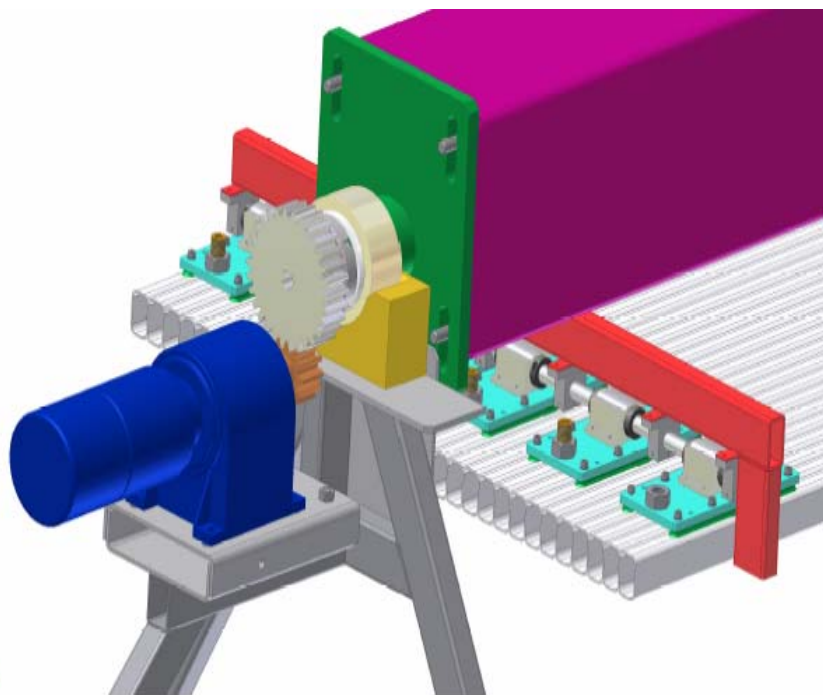
2.9.1.1 Vacuum Lifting Fixture

- Lifting fixture is used to move modules and extrusions at the module factory and during the FD assembly.
- Fixture uses rectangular suction cups aligned by fixtures with the module scallops.
- Constructed and tested a prototype for lifting full width IPND modules and full length FD modules





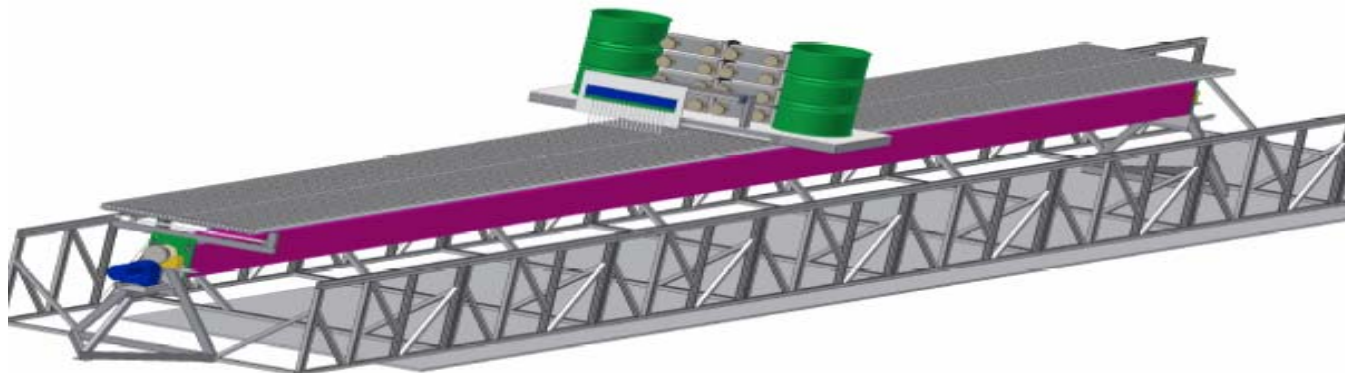
2.9.1.1 Vacuum Lifting Fixture





2.9.1.2 Adhesive Dispenser

- Gear motor driven adhesive dispenser mounted on moving carriage.
- 16 ribbons of adhesive applied in one pass along the length of a module.
- Prototype machine being constructed.
- Testing of adhesive application and spread are being conducted.





Adhesive Dispenser

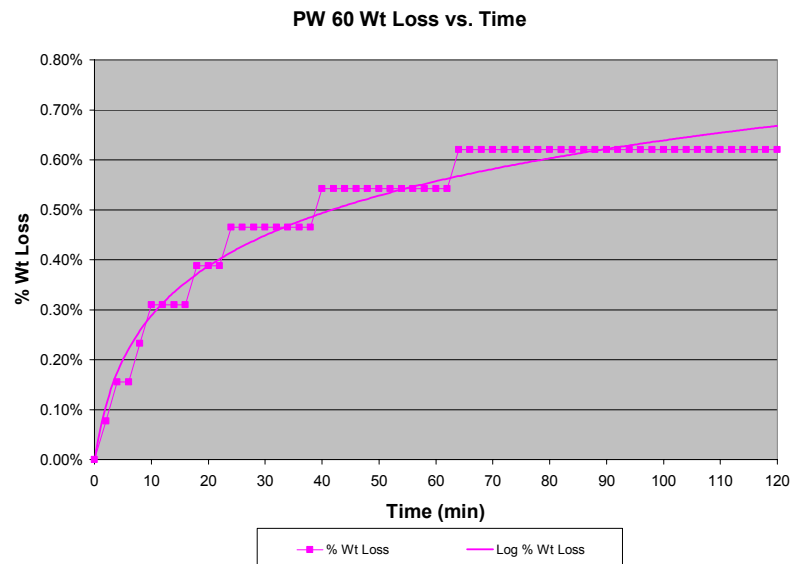
- On-going tests of methods for applying adhesive to obtain good coverage and optimum glue line thickness.





Methyl Methacrylate Measurements

- Devcon 60 is the structural adhesive – MMA released during curing.
- Extensive measurements have been conducted on MMA generation.
- MMA concentrations during prototype construction are below acceptable concentrations.
- Evaluation is continuing on how to keep MMA concentrations within acceptable limits during construction of FD.

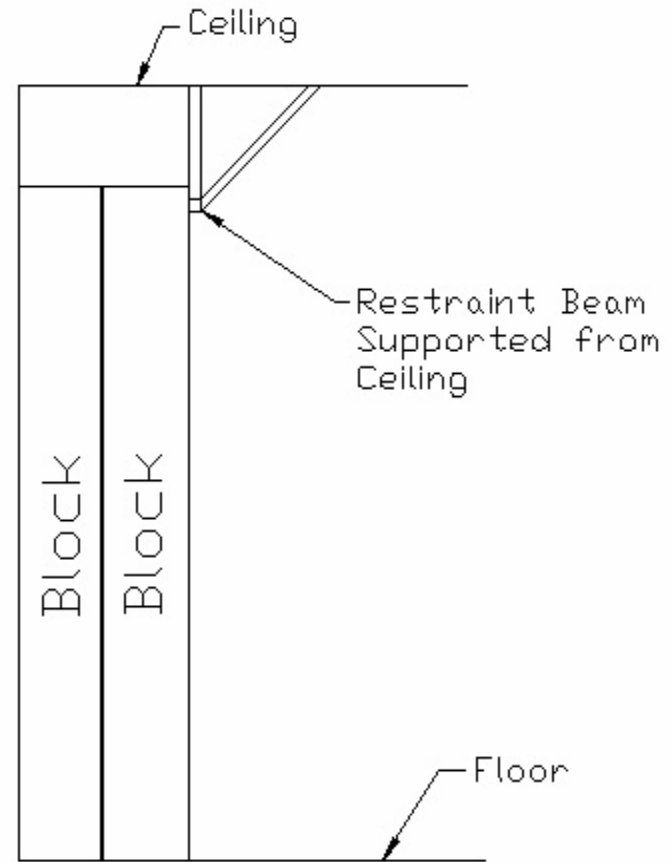


SAMPLE NO.	DATE	NAME/ BADGE NO.	LOCATION/ OPERATION	METHYL METHACRYLATE CONC. (PPM ¹)
39751	4/23/2007	Area Air Sample	E of panels on floor (4 ft. above floor)	0.8
39752	4/23/2007	Area Air Sample	E end below glue table (12 in. above floor)	0.5
39753	4/23/2007	K. Kephart/ 03119N	Adhesive Application	1.5
39754	4/23/2007	M. Slabaugh/ 14132N	Adhesive Application	4.3
39755	4/23/2007	Area Air Sample	E end of glue table, 5 ft. above floor (16 ft. E of exhaust fan)	0.9
39756	4/23/2007	Area Air Sample	Fan exhaust, 3.5 ft above floor (2.5 ft. W of fan)	0.3
39757	4/23/2007	Area Air Sample	Fan inlet (4 in. from filter)	0.7
39758	4/23 & 24/2007	Area Air Sample (Overnight)	After Panel Assembly, N side on floor (4 in. from panels on floor, 3 in. above floor)	1.5
39759	4/23 & 24/2007	Area Air Sample (Overnight)	After panel Assembly, on top of panels (9 in. above panel)	0.6



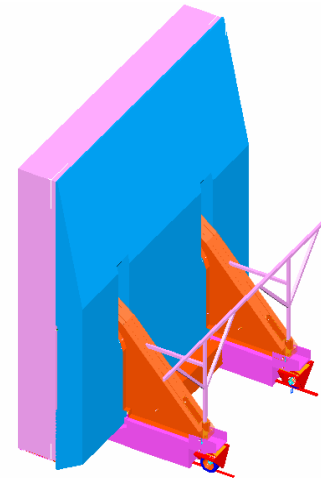
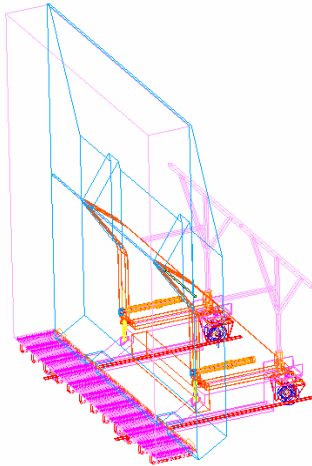
Block Restraint

- Block restraint is used during installation to provide top guided support for the last block constructed.
- Moved as the next block is raised into position.
- Used to increase SF to above 5.0
- Must restrain only 3600lbs based on FEA analysis – support from rails in ceiling





Block Raiser



- BR acts as the assembly platform and then will rotate the completed block to the vertical position.
- Preliminary design of Block Raiser Complete
- Details in next talk



2.9.1.5 Survey and Alignment Equipment

- Horizontal modules will be referenced from the bottom pallet.
- Vertical modules will be referenced from the plane Centerline.
- No special alignment tooling is needed. Modules will be referenced to each other so that any tolerances build up.
- Targets will be placed on modules and survey group will measure the constructed position of modules as each layer is completed.
- Survey data then fed back into reconstruction algorithms.



Conclusions

- Prototypes of vacuum lifting fixture and glue dispenser have been constructed.
- Glue compression tests have been occurring to determine the best way to apply/compress the adhesive.
- Some experience in module handling has been gained by constructing the IPND prototype.